MECHANICAL BEHAVIOR OF REINFORCED CONCRETE SHORT COLUMN-CFRP COMPOSITE BASED ON ABAQUS FINITE ELEMENT ANALYSIS

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DEDICATION

To my beloved mother and father

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ABSTRACT

Strengthening of the structural members and frames is one of the engineering concerns, so this study will present some structural behavior of the reinforced concrete (RC) short column wrapped by carbon fiber reinforced polymer (CFRP) sheets under pure axial static load. The nonlinear finite element analysis (NLFEA) is conducted. ABAQUS/STANDARD software is used to analyze the reinforced concrete short column wrapped in CFRP and is compared the finite element analysis results to experiment results which are included in literature. Several aspects of the confinement effect on column response such as different in cross section size, number of CFRP layers, volumetric ratio of CFRP and column size effect are examined. It is found that externally bonded CFRP sheets are very effective in enhancing the axial strength and ductility of concrete columns. In order to validate the results which obtained by the finite element analysis, a comparison with experimental work is conducted. Inspection of results shows that there is a good agreement between the NLFEA and the experimental test results.

ABSTRAK

Pengukuha anggota struktur dar kerangka adelah penting day perlu perhatan yang lebih dalam kejuruteraan kajian ini akan membertangkan trigkah laku struktur tiang pendek korkrit bertetulang yang disalut dergan polimer gertian karbon bertetulang (CFRP) yang dibebani dergan pembebanan paksi statik. Analisis kaedah unsur terhingga tak linear (NLFEA) telah dijalankan. Perisian ABAQUS/STANDARD digunakan bagi mengara lisis tiang pendek konkrit bertetulang yang disalut CFRP dan membandingkan keputusan analisis dengan keputusan ujikaji yang didapati daripada literature. Beberapa aspek tentang kesan salutan CFRP ke atas tiang seperti perbezaan saiz keratan rentas bilangan lapisan CFRP nisbal isipadu CFRP dan siaz tiang turut dikaji. Kepingan luaran CFRP ditemui cukup berkesan dalam menguatkan dan meninggikan kekuatan paksi dan kemuluran tiang konkrit. Bagi pengesahan keputusan yang didapati darpada analisis unsur terhingga, perbandingan dengan ujikaji telah dijalankan. Pemeriksaan keputusan menunjukkan keputusan NLFEA dan keputusan ujikaji adalah baik.